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$$\pi 3.24 R = \frac{\pi [3^{12} - 1]}{2 \log_e 3}. \quad R = \frac{3^{12} - 1}{2.3.24 \log_e 3}.$$

Also solved by A. H. HOLMES, J. SCHEFFER, and B. F. YANNEY.

ERRATA. In last issue, page 120, line 4 from bottom, for " $\rho = \frac{\theta^2}{c^2}$," read,
 $\rho^2 = \frac{\theta^2}{c^2}.$

PROBLEMS.

55. Proposed by GEORGE LILLEY, Ph. D., LL. D., Principal of Park School, 394 Hall Street, Portland, Oregon.

A horse is tethered by a rope, a feet long, fastened to a post in a circular fence enclosing a circular piece of ground b feet in diameter. If the horse is outside of the fence over how much ground can he feed? If he is inside the fence over how much ground can he feed? $b > a$ in each case.

56. Proposed by Prof. B. F. BURLESON, Onside Castle, New York.

Find (1) the length s of the closed curve of the cardioid; (2) its area A ; (3) if made to revolve about its axis $2a$, find the maximum longitudinal circumference C of the solid generated; (4) find the surface K of the same; (5) its volume V ; (6) the distance x_o of the center of gravity of the solid from the origin O ; and (7) the distance g_o of the center of gravity of the plane curve from the origin O .

MECHANICS.

Conducted by B. F. FINKEL, Springfield, Mo. All contributions to this department should be sent to him.

SOLUTIONS OF PROBLEMS.

31. Proposed by O. W. ANTHONY, M. Sc., Professor of Mathematics in New Windsor College, New Windsor, Maryland.

A perfectly elastic, but perfectly rough mass M , and radius R , rotating in a vertical plane with an angular velocity ω , is let fall from a height, a , upon a perfectly elastic but perfectly rough horizontal plane. Determine the motion of the body after striking the plane. What will be its ultimate motion?

II. Solution by G. B. M. ZERE, A. M., Ph. D., Professor of Mathematics and Applied Science, Texarkana College, Texarkana, Arkansas-Texas.

Let V be the vertical velocity of the center just before impact; u, v , the horizontal and vertical velocities of the center just after the first impact; ω , the